

WHISTLING RIDGE ENERGY LLC  
TOM WATSON  
PREFILED REBUTTAL TESTIMONY  
EXHIBIT NO. 8.03r

BEFORE THE STATE OF WASHINGTON  
ENERGY FACILITY SITE EVALUATION COUNCIL

In the Matter of Application No. 2009-01: WHISTLING RIDGE ENERGY LLC; WHISTLING RIDGE ENERGY PROJECT	EXHIBIT NO. 8.03r
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**APPLICANT'S PREFILED REBUTTAL TESTIMONY**

**WITNESS #9: TOM WATSON**

Q Please describe the purpose of your rebuttal testimony.

A I am providing this rebuttal testimony to respond to Dean Apostol's testimony  
(Friends/SOSA Exhibit Nos. 21.00-21.07).

Q Are you able to answer questions under cross-examination regarding your testimony?

A Yes.

Q Could you please identify what has been marked as Exhibit No. 8.04r and describe  
how it was produced?

1 A Exhibit No. 8.04r is a map identifying the number of proposed turbines for the  
2 Whistling Ridge Energy Project (Project) that would be visible from the Columbia  
3 River based on a line-of-sight analysis that accounts for screening due to topography  
4 and existing stands of trees on ridgelines between the Project site and the Columbia  
5 River. These existing stands of trees were identified on an August 2010 aerial  
6 photograph of the area and were added with an assumed height of 100 feet, which is  
7 the average height for Douglas fir trees. Figure 4.2-5 (Locations of Simulation  
8 Viewpoints) in the Application for Site Certification (ASC) merely accounted for  
9 topographic screening. Consequently, Exhibit No. 8.04r provides a much better  
10 indication of actual Project visibility from the Columbia River than Figure 4.2-5.  
11

12 Q Could you please identify what has been marked as Exhibit No. 8.05r and describe  
13 how it was produced?  
14

15 A Exhibit No. 8.05r is a map identifying stretches of I-84 from which the Project would  
16 be visible. It accounts for screening due to topography, vegetation, and structures. In  
17 contrast, Figure 4.2-5 (Locations of Simulation Viewpoints) in the ASC merely  
18 accounted for topographic screening. Consequently, Exhibit No. 8.05r provides a  
19 much better indication of actual Project visibility from I-84 than Figure 4.2-5.

20 Visibility from *eastbound* I-84 was assessed by placing a video camera in the  
21 passenger seat directly behind the driver and constantly aiming it at the Project site  
22 while the car travelled east on I-84 at 65 miles per hour from Viento State Park to the  
23 Mosier exit. Visibility from *westbound* I-84 was assessed by placing a video camera  
24 in the front passenger seat and constantly aiming it at the Project site while the car  
25 travelled west on I-84 at 65 miles per hour from the Mosier exit to Viento State Park.  
26 View angles greater than 90 degrees from straight ahead of the car (*i.e.*, over the

1 traveler's shoulder) were assumed to have zero visibility from that particular  
2 direction. This explains why, for example, the Project would be visible from  
3 eastbound I-84 in areas where it is not visible from westbound I-84. The videotapes  
4 were subsequently analyzed in our office to create Exhibit No. 8.05r.  
5

6 Q Could you please identify what has been marked as Exhibit No. 8.06r and describe  
7 how it was produced?  
8

9 A Exhibit No. 8.06r is a map identifying stretches of the Historic Columbia River  
10 Highway between Hood River and Mosier from which the Project would be visible.  
11 It accounts for screening due to topography and vegetation, and it was created by  
12 walking this part of the highway route. In contrast, Figure 4.2-5 (Locations of  
13 Simulation Viewpoints) in the ASC merely accounted for topographic screening.  
14 Consequently, Exhibit No. 8.06r provides a much better indication of actual Project  
15 visibility from the Historic Columbia River Highway between Hood River and  
16 Mosier than Figure 4.2-5.  
17

18 Q Could you please identify what has been marked as Exhibit No. 8.07r?  
19

20 A Exhibit No. 8.07r graphically illustrates the "apparent height" of a 415-foot-tall wind  
21 turbine, which was the size simulated for this Project, located between one and 15  
22 miles away from the viewer. For example, a 415-foot-tall wind turbine five miles  
23 away from a viewer would appear to have the same height as a 0.375-inch-tall object  
24 that is held 24 inches (approximately arm's length) away from the viewer. If the  
25 same wind turbine was 10 miles away, the apparent height would equal a 0.19-inch-  
26 tall object held 24 inches from the viewer. Exhibit No. 8.07r demonstrates that when

1 a 415-foot-tall wind turbine is more than five miles from a particular viewpoint, its  
2 apparent height is quite small.

3  
4 Q Could you please identify what has been marked for identification as Exhibit  
5 No. 8.08r?

6  
7 A Exhibit No. 8.08r contains the simulations for each of the 21 viewpoints analyzed in  
8 the ASC, the visual impact analysis from Section 4.2.3 (Aesthetics) in the ASC, and a  
9 variety of information about each viewpoint, including the distance from which the  
10 simulation should be viewed to approximate real life. The original simulations in the  
11 ASC were mistakenly created using a Project layout that did not exactly correspond  
12 to the Project layout in the ASC. This error was corrected for the simulations  
13 produced in the Draft Environmental Impact Statement (DEIS) for the Project and in  
14 the simulations attached as Exhibit No. 8.08r. The simulations in Exhibit No. 8.08r  
15 replace the simulations in Section 4.2.3 of the ASC. Note that in a couple of  
16 instances, such as Viewpoint 5: Willard and Viewpoint 7: Mill A, the horizontal field  
17 of view in the ASC simulations had to be cropped so that the simulation could fit the  
18 available space in Exhibit No. 8.08r. Where this caused one or more turbines on the  
19 periphery of the ASC simulations to be cropped, Exhibit No. 8.08r identifies visible  
20 turbines “as cropped from ASC.” The “photo focal length” identifies the focal length  
21 of the individual photographs that were used to create the photomontage. The  
22 “panorama focal length” is the effective focal length of the photomontage itself.

23  
24 Q The “panorama focal length” of the simulations in Exhibit No. 8.08r is not 50 mm.  
25 Instead, the panorama focal length varies from simulation to simulation. Mr. Apostol  
26 testified that “[a] 50mm focal length approximates the field of vision and scale of

1        what the human eye sees.” (Page 20, line 1.) Can you please explain why the  
2        panorama focal length is not 50 mm?

3  
4    A    Absolutely. A visual simulation should seek to present as complete a representation  
5        as possible of the relevant view that a human would perceive if standing at a given  
6        viewpoint. This is why some of the simulations in the ASC were very wide  
7        panoramas; they were trying to present as complete a representation as possible of the  
8        view that a human would see at the viewpoints. A 50 mm focal length only provides  
9        27 degree vertical and 39.6 degree horizontal fields of view, but humans’ full visual  
10       perception encompasses something between 170 and 180 degrees (just hold both your  
11       arms out to the side and slightly forward to understand this wide horizontal field of  
12       view). Thus, Mr. Apostol’s testimony that a 50 mm focal length approximates the  
13       human field of view is only correct if you define “seeing” as that narrow wedge of  
14       space that human eyes focus on directly. This is like wearing horse blinders and  
15       saying “this most closely captures human visual perception.” Because humans’  
16       horizontal field of view extends up to approximately 180 degrees, photographs with  
17       wide fields of view (*i.e.*, panoramas) represent what humans would see better than the  
18       39.6 degree horizontal field of view that a single 50 mm focal length photo would  
19       provide.

20                Exhibit No. 8.09r demonstrates the more limited field of view that would be  
21        captured with a 50 mm focal length lens at Viewpoint 19: Columbia River Highway.<sup>1</sup>

22                <sup>1</sup> There is a very important reason why the 50 mm focal length field of view is  
23        outlined within the panoramic image rather than printed as its own image of a size equal to  
24        the panorama. If the size of the 50 mm focal length outline were increased to match the size  
25        of the panoramic image, the resulting 50 mm focal length image would need to be held  
26        farther away from one’s face than the panoramic image in order to accurately compare and  
27        contrast the two images, which makes the comparison between these two versions of the  
28        same view more difficult. This problem is avoided by simply outlining the 50 mm focal  
29        length field of view within the panoramic image, thereby allowing one to appropriately  
30        (continued . . .)

1 If a person standing at Viewpoint 19 was asked to choose whether the 50 mm focal  
2 length outline (39 degree horizontal field of view) or the panorama (63 degree  
3 horizontal field of view) better represented the view from that point, the panorama  
4 would be selected as the better representation every time. This is why panoramic  
5 images are so widely and consistently used for modern visual simulations.

6 This is not to say that simply using a 50 mm focal length (or any single focal  
7 length for that matter) for all the simulations would not have any advantages. If the  
8 focal length of all the simulations were the same, then they would not need to be held  
9 at different distances from one's face to replicate the real world. However, the  
10 problem with this approach is that a 50 mm focal length does not capture as complete  
11 a representation as possible of the view that a human would perceive if standing at a  
12 given viewpoint. There's a tradeoff: the convenience created by using a single focal  
13 length versus the more complete view that can be captured in a panorama. In my  
14 opinion, it is better to capture as much of the relevant view as possible, because this  
15 then allows one to most completely simulate what a human standing at that viewpoint  
16 would see.

17  
18 Q Mr. Apostol also criticized the use of panoramic images by stating that "[s]titching  
19 together several photos to create panoramic images can also distort distance unless  
20 the reproduced image compensates." (Page 20, line 3.) How do you respond?  
21

22 A It is true that capturing a wider, more realistic perspective from a viewpoint with a  
23 wide-angle lens with a 10 to 30 mm focal length will result in some innate distortion.  
24

25 (. . . continued)  
26 assess whether a single 50 mm focal length image best approximates what a human would  
see at Viewpoint 19.

1 However, we effectively avoid this issue by taking multiple overlapping, high-focal-  
2 length (40-70 mm) images rather than one photo with a wide-angle lens. By  
3 “stitching” these high-focal-length images together, we can re-create a wide  
4 horizontal field of view that is more representative of what a human would see at that  
5 viewpoint, but without the innate distortion that a wide-angle lens would create.  
6 (This also allows for far higher resolution and detail when printing the simulations in  
7 larger sizes.) Even with this technique, a very wide panorama viewed on a flat  
8 surface would cause objects at either side to appear slightly smaller or more distant  
9 than when viewed by the naked eye in real life. However, this is not an issue for the  
10 panoramic simulations in Exhibit No. 8.08r because they are not printed at the very  
11 large scale necessary for this to be apparent. In summary, the panorama is still by far  
12 the most effective photo simulation because it provides much more of the human field  
13 of view than a 50 mm focal length snapshot.

14  
15 Q Mr. Apostol also testified:

16 “The inherent limitations of photo simulations should have been  
17 discussed in the Application. Two-dimensional photo images cannot  
18 replicate the three-dimensional world, because people see  
19 stereoscopically and will view real-life turbines from within three-  
20 dimensional space, not as if they were painted upon a flat plane. Real  
21 world visual resolution is also much greater than what can be  
22 portrayed on a photo. *Brightness ratio* is a measure of contrast  
23 between the lightest and darkest elements in any given view. On a  
24 clear day, a viewer might experience a 1,000 to 1 brightness ratio. The  
25 same image on a computer monitor provides a 100 to 1, or at best 400  
26 to 1 brightness ratio. Once this image is printed and placed in a report,  
the brightness ratio is further reduced. What this means is that a  
photographic image is inherently much lower contrast than what one  
would see in the real light of day. And since contrast is the key  
measure of impact, photo simulations tend to understate the impacts.”

24 (Page 19, lines 14-20.) How do you respond?

25 /////

26 /////

1 A I disagree that it is necessary for the ASC to state the obvious fact that viewing a  
2 photo is not the same as live human vision. In my opinion, the Council and other  
3 readers of the ASC have adequate life experience with photos to understand that  
4 photos are inferior to the real thing.

5 The assertions Mr. Apostol made regarding contrast ratio—or brightness ratio  
6 as he characterized it—both are technically outdated and result in an erroneous  
7 general conclusion. The numbers Mr. Apostol quoted for computer monitors (*i.e.*,  
8 maxing out at a 400:1 contrast ratio) were significantly exceeded more than a decade  
9 ago and continue to improve. This applies to projectors as well. Contrary to Mr.  
10 Apostol's asserted conclusion, one cannot say that photo simulations tend to  
11 understate contrast. Photos can just as easily overstate contrast. For example,  
12 computer renderings of components of a proposed development, such as turbines,  
13 rarely adequately account for two significant factors—atmospheric haze and  
14 shadow—that in the real world tend to reduce contrast between the component and its  
15 surrounding environment. The contrast ratio of an image further depends on factors  
16 including the angle and level of light in the scene, the exposure of the image, and  
17 other factors.

18 The bottom line is that photos, while not perfect renditions of the real world as  
19 viewed by the human eye, are still extremely valuable and effective tools for  
20 evaluating likely visual impacts and are much more informative of the likely visual  
21 impacts than mere written descriptions of a particular view.

22  
23 Q Mr. Apostol then testified:

24 "Another problem is that it is nearly impossible for people to judge the  
25 true scale of wind turbines when looking at photos of them taken from  
26 a distance of several miles. The problem is there is usually no clear  
frame of reference within the photo to measure the size of a turbine  
against. Unless there is something of known size near the turbines, a



1 house or barn for example, one cannot tell if the turbines are 100 or  
2 several hundred feet tall.”

3  
4 (Page 20, lines 13-14.) How do you respond?

5 A I don’t know why any casual observers travelling down I-84 or looking at the Project  
6 site from any other viewpoint would be trying to mentally calculate the actual size of  
7 the utility towers, trees, buildings, or turbines that they can see. In my opinion,  
8 knowledge of the “true scale” of an object is not needed to assess the object’s visual  
9 impact. In fact, knowing a structure’s true height is irrelevant to my perception of the  
10 structure’s visual impact. Instead, the issue is contrast. Photo simulations have  
11 limitations, but they attempt to capture, as closely as possible, a particular viewing  
12 experience and illustrate the contrast that a proposed project is likely to create.

13 Q Mr. Apostol also testified:

14 “Another problem is that the images included in the Application vary  
15 in scale. For example, the turbines appear larger or the same size in  
16 the simulation for viewpoint 3, a distance of 7.6 kilometers according  
17 to the DEIS, than they do for viewpoint 1, a distance of 6.4 kilometers  
18 according to the DEIS. How can this be? The turbines should appear  
19 to be noticeably larger in the closer view. The answer must be that the  
20 reproduced image provided, no matter what focal length was used,  
21 does not reflect the distance.”

22 (Page 20, lines 16-18.) How do you respond?

23 A Indeed, each image does vary in scale. The visual impact photographer tries to  
24 compose an image that captures as much of the relevant context around the subject as  
25 possible, in order to make it as useful a tool as possible in representing what a human  
26 would see at that viewpoint. This can result in quite different horizontal and vertical  
fields of view from viewpoint to viewpoint. Those differing vertical fields of view  
are changed when the images are resized, for example, to fit on an 8½" x 11" page for  
ASC submission purposes. Any person can replicate this at home by cropping any

1 landscape photo and then printing the original and the cropped image as the same size  
2 (*i.e.*, “blowing up” the cropped image to match the size of the original image). What  
3 is the result? Different relative scale for the same objects in the two images. Thus,  
4 scale is different for each viewpoint, and two viewpoints cannot be compared directly  
5 with each other in terms of scale.

6 However, visual impact analysis does not involve comparing one simulated  
7 viewpoint with another. Instead, it involves comparing a photograph that best  
8 represents the existing view from a particular viewpoint with a simulation of the  
9 proposed development in that same view. Scale in both the original photograph and  
10 the corresponding simulation is the same.

11  
12 Q So in summary, do you agree with Mr. Apostol’s conclusion that the simulations are  
13 “too flawed to be determinative in assessing the potential visual impacts of the  
14 proposal”? (Page 21, line 1.)  
15

16 A Absolutely not. As I have just testified, none of Mr. Apostol’s critiques of the  
17 simulations have any real merit. His critiques evidence a lack of understanding of the  
18 technical aspects of modern photography and visual simulation production. His  
19 testimony seeks to persuade the Council that photo simulations—the most valuable  
20 tool available for evaluating likely visual impacts—should be thrown out in favor of  
21 more abstract textual description.  
22

23 Q Mr. Apostol testified that animated simulations would be helpful. (Page 21, line 16.)  
24 Do you agree?

25 /////

26 /////

1 A I agree that animated simulations can be useful in certain situations, but in other  
2 situations, particularly when the viewer is moving, animated simulations are not  
3 helpful because they overstate the likely visual impacts. For example, a viewer on  
4 I-84 is not standing still but rather is moving at 65 miles per hour, often in traffic,  
5 down a curvy interstate highway. Ignoring the fact that traffic alone will tend to  
6 focus a driver's attention on the road, Dautis Pearson has testified that as an  
7 observer's speed increases, the observer tends to focus along the line of travel, such  
8 that travelling down the highway at this speed will tend to decrease the visual impact  
9 of the moving blades. (Exhibit No. 9.02r, page 26.) Because a static animation (*i.e.*,  
10 one in which the viewer is not moving) will not represent the viewer's movement, the  
11 visual impacts will tend to be overstated in such an animated simulation.

12  
13 Q Are any of Mr. Apostol's critiques of the visual simulations relevant and productive?

14  
15 A Yes. I heartily agree that reproducing the simulations on 8½" x 11" paper greatly  
16 limits their effectiveness, which is why the simulations found in Exhibit No. 8.08r  
17 have been printed on 11" x 17" paper for purposes of the Council's review.

18 I also agree with Mr. Apostol that educating the viewer as to the distance from  
19 which the simulation should be viewed to correspond with the real-world perspective  
20 would improve the effectiveness of the visual simulations. For this reason, this  
21 information is provided for each simulation in Exhibit No. 8.08r.

22  
23 Q Mr. Apostol testified that wind turbines "can create substantial impacts even when  
24 viewed from distances of 10 miles or more." (Page 6, line 3.) Could you please  
25 describe the apparent size of wind turbines when viewed from such distances?

26 ////

1 A While wind turbines can be visible beyond 10 miles in clear conditions with low  
2 haze, they appear very small when viewed from a distance of more than five miles.  
3 For example, a 415-foot-tall wind turbine, which was the size simulated for this  
4 Project, that is five miles away has the apparent height of an object about 0.375-inch-  
5 tall that is two feet in front of one's face. If the wind turbine is 10 miles away, it has  
6 an apparent height of an object 0.19-inch-tall that is two feet in front of one's face.  
7 The rapidly decreasing apparent height of a 415-foot-tall wind turbine is illustrated in  
8 Exhibit No. 8.08r. As the point of observation moves beyond 10 miles, atmospheric  
9 haze causes wind turbines to increasingly disappear or blend into the surrounding  
10 landscape.  
11  
12 Q Let's turn to some of Mr. Apostol's more specific critiques about particular  
13 viewpoints. Mr. Apostol testified that I-84, the Columbia River, and the Historic  
14 Columbia River Highway are KVA corridors that "run[] within 3 miles of the project,  
15 yet all sample viewpoints are more than 4 miles from the project. Additional views  
16 along these KVAs should have been analyzed." (Page 19, lines 2-3.) How do you  
17 respond?  
18  
19 A To assess whether additional viewpoints along these KVA corridors within three  
20 miles of the Project site should have been analyzed, one must first have a sense of the  
21 visibility of the Project site from these locations. As Exhibit No. 8.05r illustrates, the  
22 stretch of I-84 within three miles of the nearest proposed turbine is less than 2.5 miles  
23 long. Of those 2.5 miles, only 6,094 feet (primarily in the eastbound direction) have  
24 any potential turbine visibility, and that visibility is broken up into a handful of very  
25 brief visibility windows of 1-6 seconds each, plus one 3,570-foot stretch at Mitchell  
26 ////

1 Point lasting approximately 38 seconds when travelling at 65 miles per hour.<sup>2</sup> These  
2 are no closer than 2.7 miles from the nearest proposed turbine location.

3 Only small portions of one to four turbines are visible from any of the brief  
4 visibility windows, and the view of the Project from these brief windows is at a nearly  
5 90 degree angle to the direction of travel, requiring travelers to turn their heads hard  
6 to the left or right depending on their direction of travel. This would have the  
7 practical effect of preventing the vast majority of drivers and many passengers  
8 travelling on I-84 from experiencing these views. Furthermore, this orientation is  
9 contrary to the natural and comfortable angle of focus for passengers, most of whom  
10 will likely be focusing about 45 degrees left or right of straight ahead. This is a  
11 simple common-sense experience to which any experienced freeway traveler can  
12 relate. Thus, those passengers sitting on the north side of vehicles travelling on I-84  
13 who make a concerted effort to view the north side of the river during these brief  
14 visibility windows will be able to see small portions of one to four turbines within  
15 these windows.

16 Although the Project would be visible from eastbound I-84 for a 3,570-foot  
17 stretch (38 seconds at 65 miles per hour) at Mitchell Point, the terrain and visibility  
18 analysis we did indicated that only portions of two to three turbines would be visible.  
19 Thus, we determined that this stretch of eastbound I-84 did not warrant a simulation  
20 in addition to Viewpoint 13: I-84 Eastbound.

21 As for the Columbia River, as Exhibit No. 8.04r illustrates, within three miles  
22 of the Project site, the visibility areas are primarily limited to very near the southern  
23 shore. Turbine visibility from these areas is even less than that from I-84, with even

24 <sup>2</sup> There is also a 19-second window of visibility on eastbound I-84 before Mitchell  
25 Point, but this window is more than three miles from the nearest turbine. Regardless, the  
26 view from this 19-second window is similar to the view from the 38-second window  
discussed above.

1 smaller portions of one to four turbines visible. Furthermore, recreational usage  
2 within this narrow strip of the river along the southern shore would likely be fairly  
3 limited since there are no beaches other than Viento State Park, and the steep banks,  
4 rocky shores, interstate highway, and railroad tracks make it unlikely that  
5 recreationists will be using these shores. Similarly, windsurfers and small boaters  
6 would likely tend to avoid the dangers of approaching too close to the rocky southern  
7 shore.

8  
9 Q So, recognizing that there is limited visibility of the Project site from those portions  
10 of I-84 and the Columbia River within three miles of the nearest proposed turbine, in  
11 your opinion should additional viewpoints have been analyzed along these two  
12 corridors?

13  
14 A No. In doing our initial reconnaissance of the area and GIS analysis of the terrain, it  
15 quickly became very clear that by far the view from the Columbia River with the  
16 greatest number of turbines visible at the least distance would be in the vicinity of  
17 Viento State Park looking up the Little White Salmon River Canyon between Cook  
18 Hill and Chemawa Hill/Underwood Mountain. This was confirmed when we  
19 completed the simulation for Viewpoint 14: Viento State Park, which showed 22  
20 visible turbines. As one moves away from this point of maximum visibility,  
21 sightlines to the turbines decrease rapidly. As one moves north across the river,  
22 visibility drops to zero near the north shore. That visibility also drops rapidly moving  
23 east or west along the Viento State Park shoreline. The further east one travels on the  
24 river, the more the steep terrain of Chemawa Hill and Underwood Mountain on the  
25 north shore obscures visibility, which is reduced to zero just before Ruthton Point.  
26 Thus, in my opinion, the site selected as Viewpoint 14: Viento State Park represented

1 the location west of the Project site from which the Project would be most highly  
2 visible on the Columbia River.

3 As for selecting a viewpoint along I-84 in this area, thick vegetation in and  
4 around Viento State Park entirely obscures the view of the Project site from  
5 eastbound I-84 in that area, as illustrated in Exhibit No. 8.05r. As one travels east on  
6 I-84 from the area of Viento State Park, there are brief visibility windows of a view  
7 up the Little White Salmon River Canyon to the Project site, similar to that  
8 represented by Viewpoint 14: Viento State Park. However, foreground vegetation  
9 along the north side of I-84 limits visibility to a few short windows, and the steep  
10 terrain of Chemawa Hill and Underwood Mountain on the north shore effectively  
11 screens all but small portions of primarily one to four turbines from view in most of  
12 these windows. Viewpoint 13: I-84 Eastbound was taken from one short visibility  
13 window where 14 turbines are visible representing the location from which the  
14 Project would be most highly visible from eastbound I-84. The limited visibility  
15 along eastbound I-84 reduces to zero soon after Mitchell Point.

16 Thus, I can declare with great confidence that the simulations of Viewpoint  
17 14: Viento State Park and Viewpoint 13: I-84 Eastbound represent the greatest  
18 potential visibility along the Columbia River and I-84 KVAs west of the Project site,  
19 in terms of the greatest portion of the Project being visible from the closest distance  
20 possible.

21  
22 Q Sticking with Viewpoint 13: I-84 Eastbound, Mr. Apostol testified:

23 “In looking at the viewpoint map [Figure 4.2-5 in the ASC], it appears  
24 that these same turbines would be visible from along I-84 stretching 2  
25 miles to the west and several miles to the east, including locations  
within 3 miles of the project site. This equates to a long-duration view,  
possibly including additional visible turbines.”

26 (Page 25, lines 11-12.) Do you agree with this statement?

1 A No. Figure 4.2-5 (Locations of Simulation Viewpoints) in the ASC only accounted  
2 for topographic screening. It did not address screening due to vegetation, but this is  
3 addressed in Exhibit No. 8.05r, which shows that turbine visibility west of Viewpoint  
4 13 on I-84 is zero with the exception of two more “eye blink” windows a few seconds  
5 west. East of Viewpoint 13 on I-84 there are two short-duration (*i.e.*, 19-second and  
6 38-second) windows of visibility around Mitchell Point. As I previously described,  
7 based on our terrain and visibility analysis of these sections, only portions of two to  
8 three turbines would be visible. Thus, the two short-duration windows of visibility  
9 around Mitchell Point and the extremely limited visibility of the Project did not  
10 justify an additional full simulation in this part of I-84. Between Mitchell Point and  
11 exit 64 at the eastern end of Hood River, visibility is limited to very sporadic “eye  
12 blink” windows, as illustrated in Exhibit No. 8.05r.

13  
14 Q You mentioned Ruthton Point. Mr. Apostol testified that

15 “simulations from the Historic Columbia River Highway at Mitchell  
16 Point and at Ruthton Point, directly across the Columbia River from  
17 the project would be helpful in capturing representative views. A good  
18 representative set of simulations should include the logical worst-case  
impacts. As it stands, the Application seems to avoid worst-case  
impacts analysis.”

19 (Page 19, lines 3-5.) In critiquing the selection of Viewpoint 19: Columbia River  
20 Highway, Mr. Apostol expressed a concern “the Historic Columbia River Highway  
21 runs within 3 miles” of the Project site. (Page 26, line 12.) Were you aware that the  
22 Historic Columbia River Highway runs within three miles of the Project site? Do you  
23 agree that simulations from Mitchell Point and Ruthton Point would have been  
24 representative of views from the Historic Columbia River Highway?

25 /////

26 /////



1 A Yes, we were aware that there are isolated portions of the Historic Columbia River  
2 Highway within three miles of the Project site, and we performed terrain and  
3 visibility analyses for Mitchell Point and Ruthton Point to assess whether a simulation  
4 should be created from these points. We found that the visibility of the Project in  
5 these two spots consists of only portions of two to three turbines. Thus, even though  
6 they are within three miles of the Project site, we determined that they did not justify  
7 full simulations in addition to the ones we already did at Viewpoint 14: Viento State  
8 Park and Viewpoint 13: I-84 Eastbound.

9 Furthermore, it is misleading for Mr. Apostol to suggest that the Historic  
10 Columbia River Highway “runs” within three miles of the Project site. Within three  
11 miles of the Project site are a number of isolated portions of the Historic Columbia  
12 River Highway. Mitchell Point and Ruthton Point are parts of these isolated portions;  
13 they are not currently part of any completed section. I note that these isolated  
14 portions of the Historic Columbia River Highway were excluded from the National  
15 Historic Landmark designation that was bestowed upon other parts of the highway.  
16 The Friends of the Historic Columbia River Highway has a wish list of future projects  
17 on its website that includes a hiking and biking trail connection from Viento State  
18 Park to Mitchell Point and on to Ruthton Point, but these projects are not yet even  
19 started and are “subject to necessary funds being secured.” Currently, Mitchell Point  
20 is a simple viewpoint accessible from I-84. The remnants of Historic Columbia River  
21 Highway at Ruthton Point consist of a short section of old stone guard rail and weed  
22 choked patches of ancient asphalt, and access is primitive require some  
23 determination to find. When we considered the Historic Columbia River Highway as  
24 a KVA, we focused on the finished recreation section from which the Project site is  
25 visible, namely the Mosier Twin Tunnels section, which starts on the east side of

26 /////

1 Hood River and continues west to Mosier. Exhibit No. 8.06r illustrates turbine  
2 visibility from this section of the Historic Columbia River Highway.

3  
4 Q You already discussed in detail the analysis that drove the selection of Viewpoint 13:  
5 I-84 Eastbound and Viewpoint 14: Viento State Park, which are in the Columbia  
6 River and I-84 KVAs *west* of the Project site. Please do the same for those parts of  
7 these two KVAs that are *east* of the Project site, including Viewpoint 11: I-84  
8 Westbound and Viewpoint 12: Koberg Beach State Park.

9  
10 A Travelling west on I-84, the Project first becomes visible a few hundred feet before  
11 the Mosier exit. This location is about 11 miles from the nearest turbines. At this  
12 distance, the apparent size of one full turbine would equal an 0.18-inch-tall object  
13 held two feet from one's face. The same is true of visibility on the Columbia River  
14 around Mosier. As illustrated in Exhibit No. 8.04r, turbine visibility on the Columbia  
15 River is at its maximum number—26 to 35 turbines—from between Mosier to just  
16 west of Koberg Beach State Park. This makes Koberg Beach State Park the ideal  
17 representative viewpoint because it represents the greatest number of turbines visible  
18 at the least distance.

19 Visibility of the Project site is very sporadic on I-84, with many foreground  
20 obstructions in the two miles between Mosier and Viewpoint 11: I-84 Westbound.  
21 Viewpoint 11 is located on a brief straight stretch of I-84 that is pointed directly at the  
22 Project, so even drivers have clear visibility straight out the windshield. This  
23 orientation and the fact that close to the maximum number of turbines are visible  
24 make this another ideal location to depict the greatest number of turbines visible at  
25 the least distance. As Exhibit No. 8.05r shows, there are certainly spots along I-84  
26 westbound that are closer to the Project site than Viewpoint 11. However, fewer

1 turbines are visible from these locations. The Council should be aware that the static  
2 simulation of Viewpoint 11 may well overstate the Project's visual impacts. Viewers  
3 at this viewpoint are travelling at 65 mph on a busy, curvy interstate highway. Dautis  
4 Pearson has testified that as an observer's speed increases, the observer tends to focus  
5 along the line of travel. (Exhibit No. 9.02r, page 26.) I feared for my life when I  
6 pulled over onto the narrow westbound shoulder to take this photograph with barely a  
7 car width between the guard rail and the semi-trucks whizzing by.

8 These two viewpoints are ideal representative viewpoints because they  
9 represent the greatest number of turbines visible at the least distance on the I-84 and  
10 Columbia River KVAs east of the Project site.

11

12 Q In your opinion, can anything of further substance be learned by additional  
13 simulations along this eastern section of the I-84 and Columbia River KVAs?

14

15 A This section of river and freeway is pointed nearly uniformly in the same direction  
16 relative to the Project, so traveling up and down this section changes the angle of  
17 view very little. Consequently, the only things that would change as you travel to the  
18 west toward Hood River would be incremental decreases in the quantity of partially  
19 obscured turbines and incremental increases in the apparent size of the turbines, with  
20 that apparent size increasing from the equivalent of about a 0.18-inch-tall object held  
21 two feet away from one's face at Mosier to about a 0.3-inch-tall object held two feet  
22 away from one's face at exit 64 at the eastern end of Hood River, which is  
23 approximately 5.5 miles from the nearest proposed turbines. West of exit 64, the  
24 Project site is only visible through short visibility windows. In my opinion, little  
25 would be learned by additional simulations on this stretch.

26 /////

1 Q As to Viewpoint 11: I-84 Westbound, Mr. Apostol testified that it was “convenient  
2 for the Applicant” that the simulation had white clouds at the horizon line, insinuating  
3 that this photo had been purposefully taken to minimize the contrast between wind  
4 turbines and a blue or gray sky. (Page 23, line 2.) Are Mr. Apostol’s accusation and  
5 analysis well founded?  
6

7 A Setting aside my natural offense that Mr. Apostol would even imply such an  
8 accusation with no evidence to back it up, let me first describe how the photographs  
9 were obtained. Except for the photographs of Viewpoint 15: Frankton Road and  
10 Viewpoint 16: Fairview Road, which were taken by an SDS employee, I took all the  
11 photographs during three field photo trips to Hood River: Viewpoints 1-14 on  
12 August 8, 2007; Viewpoints 17-20 on May 27, 2008; and Viewpoints 21-23 on  
13 September 10, 2008. The Applicant recommended the initial set of viewpoints,  
14 which we then evaluated by GIS analysis and ground surveys. Each of my later two  
15 trips corresponded with additional viewpoints that had been selected based on public  
16 input. Each viewpoint was photographed only once, with the exception of Viewpoint  
17 8: Windance, which was retaken on May 27, 2008 because the horizontal field of  
18 view captured on August 8, 2007 did not cover the horizontal extent of the Project.  
19 The only effort made to select weather for these trips was to check the forecast before  
20 leaving my office in Hillsboro to make sure the forecast was for a mostly sunny day,  
21 because we believe it is logical for the weather in simulations to correspond to the  
22 weather in which people are most likely to be outside. During each field trip, I went  
23 to each new viewpoint that was to be added, captured the necessary pictures, and  
24 returned to Hillsboro. There was no doubling back or duplicating previous trips to try  
25 to capture a particular type of sky, whether that be blue, gray, or cloudy. As is typical  
26 for weather in the area, there were clouds in the sky during each of those trips. It was

1 mere chance that determined whether a particular viewpoint had clouds in the  
2 backdrop when we arrived at the viewpoint. To be clear, there was neither an  
3 intention nor the opportunity to manipulate the selection of weather at each viewpoint  
4 for supposed advantage.

5 As for Mr. Apostol's assertion that clouds in the background necessarily  
6 minimize apparent contrast, this is patently false. This generalization is not supported  
7 by the relationship between color, light, and contrast. Exhibit No. 8.10r contains a  
8 version of Viewpoint 11: I-84 Westbound in which the clouds behind the turbines  
9 have been digitally replaced with sky gradient that matches the surrounding  
10 photographed sky. In my opinion, when compared with the original Viewpoint 11  
11 simulation, even an untrained eye can see that the wind turbines in the original  
12 simulation (with clouds) contrast no less with the background than the edited  
13 simulation (without clouds). This is due to a basic principle of landscape lighting and  
14 contrast, namely that the level and perception of contrast of the landscape object (*i.e.*,  
15 the turbines) in relation to a background object (*i.e.*, the clouds) depends on the  
16 apparent colors of these two objects. Apparent color is the color the eye perceives in  
17 a given situation. The apparent color of each object depends on (a) the intrinsic color  
18 of the object, such as the white painted turbines, and (b) the lighting, which in  
19 landscape scenery nearly always means the location of the sun in relation to the  
20 landscape object (*i.e.*, the turbines) and the viewer (*i.e.*, the camera). In this case, the  
21 wind turbines are between the sun in the west and the camera in the east. Thus, the  
22 sides of the turbines facing the camera are in their own shadow, which effectively  
23 gives them a gray color that more closely matches the horizon sky here than the  
24 clouds.

25 ////

26 ////

1 Q Mr. Apostol also testified that “the very light clouds . . . reflect light and diminish the  
2 contrast of the sky-lined turbines” in Viewpoint 14: Viento State Park. (Page 25,  
3 line 20.) Do you agree?  
4

5 A Mr. Apostol is partially correct. Exhibit No. 8.10r contains a version of Viewpoint 14  
6 in which the clouds behind the turbines have been digitally replaced with sky gradient  
7 that matches the surrounding photographed sky. In my opinion, the version with the  
8 clouds does diminish the contrast for the four turbines right at the top of the hill when  
9 compared to the version in Exhibit No. 8.10r without clouds due to the fact that the  
10 sun is behind the camera in this simulation. That said, Mr. Apostol’s broader  
11 generalization that clouds behind turbines necessarily diminishes contrast is  
12 unfounded. As I previously described, apparent color will change based on lighting,  
13 which will change throughout the day, so one cannot say that clouds behind turbines  
14 necessarily diminishes contrast. Mr. Apostol’s testimony does not demonstrate an  
15 understanding of this concept.  
16

17 Q Turning to Viewpoint 19: Columbia River Highway, Mr. Apostol testified:  
18 “Selecting this single viewpoint over 7 miles from the project may not  
19 fully reflect the actual impacts to this Key Viewing Area. In addition,  
20 the atmospheric conditions in the photo simulation (DEIS Figure 3.9-  
21 14) diminish the visibility of the turbines due to the white clouds on  
the horizon. Based on viewing the wireframe in the DEIS, I conclude  
that the turbines would be very visible and moderate to high contrast,  
and would be co-dominant to dominant.”

22 (Page 26, lines 8-10.) How do you respond?  
23

24 A This location, at the far western end of the only extended section of the Historic  
25 Columbia River Highway in the view shed of the Project, is by far the location on the  
26 Historic Columbia River Highway from which the Project would be most highly

1 visible due to the largest number of visible turbines and the closest distance. This  
2 section of the Historic Columbia River Highway—called the Mosier Twin Tunnels  
3 section—extends approximately 4.6 miles between Hood River and Mosier. As  
4 Exhibit No. 8.06r illustrates, of the full 4.6 miles of this section of the Historic  
5 Columbia River Highway, less than 2,750 feet of it have any visibility to the Project  
6 because the vast majority of the section is bordered by dense trees. East of  
7 Viewpoint 19: Columbia River Highway, those few brief windows of visibility that  
8 do exist are mostly clustered near the Mosier end, which is more than three miles  
9 farther away from the Project site than Viewpoint 19. Consequently, Viewpoint 19  
10 illustrates the greatest potential Project visibility along the Historic Columbia River  
11 Highway.

12 Mr. Apostol also claims that clouds on the horizon diminish turbine visibility  
13 in this simulation. Just as in the Viewpoint 11: I-84 Westbound simulation, in this  
14 simulation the sun is west of the turbines, placing them in their own shadow and  
15 lending them a gray shade. Exhibit No. 8.10r contains a version of Viewpoint 19 in  
16 which the clouds behind the turbines have been digitally replaced with sky gradient  
17 that matches the surrounding photographed sky. In my opinion, the version with the  
18 clouds has no less contrast than the version without clouds. This is again explained  
19 by the fact that the clouds here are mostly whitish while the apparent color of the  
20 shadowed turbines is gray, which more closely matches the horizon sky gradient.  
21 That is not to say that this will be true at other times of the day when the apparent  
22 color of the horizon sky, clouds, and turbines may be different.

23  
24 Q Mr. Apostol testified:

25 “Some of the selected viewpoints include a substantial amount of  
26 clutter and development in the foreground. For example, Viewpoint 20  
(State Route 35, Application Figure 4.2-23 includes an industrial

1 complex in the immediate foreground. My memory of State Route 35  
2 is that it is not lined with industrial complexes in the foreground,  
making the selection of this particular viewpoint a bit misleading.”

3 (Page 26, lines 16-17.) Is Mr. Apostol’s critique justified?  
4

5 A No. When I was driving up and down State Route 35 looking for a viewpoint in the  
6 upper valley, I discovered that, with the exception of a few brief glimpses between  
7 trees, nearly the entire stretch is obscured from clear view of the Project site by trees,  
8 terrain, and buildings. It was not until I got to the big corner near Neal Creek Road,  
9 where State Route 35 bends to the west and starts climbing more steeply, that I finally  
10 found clear visibility to the Project site. Although it is possible that a location further  
11 up the hill to the southwest may have removed the industrial buildings from the  
12 foreground, within a couple hundred feet in either direction of Viewpoint 20 the road  
13 moves again behind obscuring buildings or trees, and this location had a turn-off  
14 from a fairly busy road that allowed me to safely capture a representative view of the  
15 Project site from State Route 35.  
16

17 Q Mr. Apostol testified that

18 “the simulation for Viewpoint 7 (Mill A, DEIS Figure 3.9-7) was  
19 taken from within the BPA transmission line easement and includes  
20 transmission towers in the foreground. The residents of Mill A and the  
recreation visitors in this area probably don’t spend a great deal of  
time inside the BPA transmission line easement.”

21 (Page 26, lines 18-19.) Why did you choose this viewpoint?  
22

23 A First, it was photographed from Cook-Underwood Road, next to where the BPA  
24 transmission line easement crosses the road, not from within the BPA right-of-way.  
25 When selecting viewpoints in a specific area, I always sought the location with the  
26 most complete view of the Project. In the Mill A area this was challenging because



1 the turbines were situated on a long ridgeline paralleling the area, which required a  
2 wide, unobstructed field of view. Second, the road here is lined on the east by  
3 residences and stands of trees interspersed with gaps that offer some visibility to the  
4 Project site but none as complete or wide as the location identified for Viewpoint 7,  
5 which has the most complete view of the Project. Third, alternative locations I  
6 considered were the north end of the gap near Deerfield Lane and the gap near the  
7 intersection of Cook-Underwood Road and Jessup Road, but both suffered from the  
8 obscuring stands of middle ground trees that narrowed the field of view. Finally, the  
9 prominence of the BPA transmission line is unfortunate, but its size makes it a reality  
10 from nearly any viewpoint among this small group of homes looking east. I would  
11 have been misrepresenting the visual impacts if I had used a view with less than the  
12 most complete view of the Project in order to avoid showing the transmission line.

13  
14 Q Mr. Apostol testified that the ASC should “acknowledge” that Viewpoint 10:  
15 Panorama Point “is a public park established specifically for its outstanding views of  
16 the landscape in all directions.” (Page 27, lines 2-3.) Is this an accurate  
17 characterization?

18  
19 A No. Panorama Point is a wonderful viewpoint with views in several directions, but  
20 Mr. Apostol neglects to mention the two huge transmission lines that bisect the view  
21 from Panorama Point and are supported by two large towers standing a few feet from  
22 where visitors stand with their cameras. These transmission lines significantly disrupt  
23 two or more major sectors of the view from Panorama Point. Had I sought to  
24 manipulate the view, as Mr. Apostol’s testimony insinuates, I simply could have  
25 moved the camera a few feet to my left and those transmission lines would have  
26 bisected the field of view in the photograph for that viewpoint. Unlike the situation

1 with Viewpoint 7: Mill A, where I could not capture the most complete view without  
2 including the transmission lines, at Panorama Point, I could capture the most  
3 complete view without having to include the transmission lines, which is what I did.  
4

5 Q Mr. Apostol testified that the visual simulations appeared not to portray forest  
6 clearing that would be required for the Project, new access roads, and the cumulative  
7 effects of “periodic commercial timber clearcutting.” (Page 27, line 19.) Will you  
8 please comment on these relative to the visual simulations?  
9

10 A As Section 2.3.6 (Forest Harvest) in the ASC describes, some small permanent forest  
11 clearings will occur around each of the turbines. In the period of time shortly after  
12 construction, this will likely slightly change the appearance around the base of some  
13 turbines that are on slopes that face a particular viewpoint, but there would be little if  
14 any noticeable change in the appearance around the turbines located on slopes not  
15 visible from a particular viewpoint. We did not attempt to model or portray this for  
16 several reasons. First, those areas of the Project site that had been harvested recently  
17 already give some indication of how the Project site may appear immediately after  
18 construction. For example, see Viewpoint 5: Willard and Viewpoint 7: Mill A.  
19 Second, as Figure 2.3-4 (Turbine Timber Buffer) in the ASC illustrates, trees will be  
20 grown around the turbines, such that the only way someone could perceive the  
21 permanent forest clearing around the turbines is if that person was higher than the  
22 turbine pads and could look down into the cleared area. None of the viewpoints have  
23 a downward viewing angle. Third, even if one did have the necessary viewing angle,  
24 the perceptible change caused by permanent forest clearings would be quite small for  
25 any viewpoints more than a few miles away.

26 /////

1           As for the access roads, new access roads are planned on the top of the ridge  
2           inside the tree line, not across the side slopes facing the cameras, so these access  
3           roads would likely not be visible from the selected viewpoints. It is possible that one  
4           or more stub roads that may branch off the main access roads to individual turbines  
5           would be visible during the period of time shortly after construction, but these roads,  
6           just like the small permanently cleared areas around the turbines, will be screened  
7           from view by timber growing on the sides of the ridges. Also, just as with the forest  
8           clearings around the turbines, the perceptible change caused by these stub roads  
9           would be quite small for any viewpoints more than a few miles away.

10           As for the cumulative effects of “periodic commercial timber clearcutting,”  
11           the Project site is and will continue to be used for commercial timber production,  
12           which results in a rotation of harvesting, planting, growing and maturing over  
13           decades, and then harvesting again. This rotation is clearly visible in Viewpoint 5:  
14           Willard and Viewpoint 7: Mill A; some areas are clear, some have small trees, and  
15           some have mature trees. This rotation will continue through the life of the Project,  
16           such that the net change on the landscape over time will be neutral in comparison to  
17           today. Because there will be no time when the whole site has just been harvested, it  
18           would make no sense to attempt to simulate such a state. Instead, today’s various  
19           stages of commercial timber production serve as an excellent representation of the  
20           visual aspects of continued commercial timber harvests.

21           In summary, we have not attempted to visually portray or model these three  
22           aspects of the Project because at best they would be neutral, out of view, or  
23           imperceptible, and at worst these aspects for all but the closest viewpoints would be  
24           so small compared to the whole scene with the turbines as to be all but unnoticeable  
25           to most observers.

26       /////

1 Q In summary, after reviewing Mr. Apostol's testimony regarding the visual  
2 simulations, how would you characterize the accuracy, relevance, and objectivity of  
3 his critiques?  
4

5 A Starting with his opening comments regarding the value of photographic imagery in  
6 judging visual impacts, Mr. Apostol's testimony seems aimed at throwing out  
7 objective representations of the likely visual effects of the Project (*i.e.*, visual  
8 simulations) in favor of very subjective textual descriptions of the visual world. The  
9 expense, hardware requirements, and dearth of effective digital tools made it difficult  
10 to produce accurate visual simulations up until about 10 years ago, but 3D and digital  
11 imagery technology has made huge strides in developing digital tools that are adept at  
12 closely simulating the visual world. Anyone who has been knee-deep in this  
13 technology explosion, as I have for the last eight years, has seen exponential jumps in  
14 the capability and realism of the tools available. Mr. Apostol's testimony regarding  
15 the relationships between focal length, field of view, and scale does not evidence a  
16 complete understanding of the hands-on technical work in photography and digital  
17 3D technology. The inaccurate, sweeping generalizations in his testimony about the  
18 relative contrast of clouds or sky behind wind turbines fail to account for fundamental  
19 principles that affect lighting and contrast, and thus visual impact. Although I am  
20 inclined to forgive his technical errors and factual oversights, I am less willing to  
21 overlook his insinuations and aspersions on my integrity. I can guarantee that the  
22 work I have produced has been with the single goal of portraying the most complete,  
23 objective representation of the likely visual effects of this Project.  
24  
25  
26